



Volume 117

2022

p-ISSN: 0209-3324

e-ISSN: 2450-1549

DOI: <https://doi.org/10.20858/sjsutst.2022.117.13>



Journal homepage: <http://sjsutst.polsl.pl>

Article citation information:

Piotrowska-Trybull, M., Kozuba, J., Sirko, S. Impact of airports on the environment: opinions of local community representatives. *Scientific Journal of Silesian University of Technology. Series Transport*. 2022, **117**, 191-209. ISSN: 0209-3324.

DOI: <https://doi.org/10.20858/sjsutst.2022.117.13>.

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IMPACT OF AIRPORTS ON THE ENVIRONMENT: OPINIONS OF LOCAL COMMUNITY REPRESENTATIVES

Summary. Research presented in this article was undertaken to determine how representatives of authorities and residents of communes perceive airports in the context of the impact of these airports on the socio-economic situation in the communes. The goal was achieved using: analysis of documentation of communes, analysis of data on the functioning of airports, and a diagnostic survey using the interview technique and survey technique. The research was carried out on representatives of 5 communes located in Poland. To analyse the collected material and present the results, Statistica v.13.3, R v.4.0.0 and RStudio editor software were used. Results of this research proved that airports play a pivotal role in stimulating the development of the region. They influence the quality of life in the commune by contributing to the creation of jobs, attracting investors, and generating income for the municipal budget through taxes paid.

Keywords: airports, communes, local development, local environment

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1. INTRODUCTION

Actions taken over the years increased the reliability of aircraft, the formation of a safety culture, improved travel comfort, reduced travel time, reduced ticket prices, and the development of low-cost airlines have made the use of air transport popular. The phenomenon of globalization, the development of the internet and the way the young generation function has also been fundamental to the increased popularity of this branch of transport [2, 6-7, 13, 29, 37, 44].

One of the main pillars of modern transportation is air transport, which has a major impact on the movement of people and cargo. It enables people to access leisure destinations and enjoy exploring the cultures and traditions of distant countries. Due to its capabilities concerning the movement of goods, new ways of doing business for companies have also emerged [17, 30, 32].

The link between this branch of transport and land transport is airports, which, depending on the intensity of air operations, have different sizes. Integrated with road and rail networks, they play an important role in the air transportation system. In this article, airports will be seen as separate areas designed for the performance of take-offs, landings and movement of aircraft, together with permanent facilities located within its boundaries [30, 39].

The presence of airports, in addition to railroads, freeways (including expressways and motorways), ferry bases, and border crossings, determines the communication accessibility of specific locations in space and is an element strengthening their investment attractiveness (Gawlikowska-Hueckel (ed.), 2000). Their role may be evidenced by the fact that the proximity of airports is one of the most important factors considered by companies when moving to a specific location [39].

Transport accessibility affects the conditions for doing business in a region and commune and is an asset that attracts prospective investors. Therefore, the presence of an airport is crucial in the context of shaping regional and local competitive advantages conditioned by the quality of the environment and the geographical concentration factor [17, 22, 26].

Airports, by attracting investors, paying taxes, creating jobs, also in their surroundings, offering domestic and international connections, and contributing to the development of tourism, dynamize the development of a region and the localities in their vicinity (direct, indirect, induced, catalytic effects) [5, 8, 17, 21, 30, 36 42].

From an economic standpoint, the presence of an airport is a factor that promotes the development of a region. However, like other large facilities of an industrial nature, the airport, to some extent, adversely affects people and the environment, especially in its immediate vicinity. One such factor is noise, mainly generated by aircraft engines and increased vehicle traffic around the airport [9-10, 14, 16, 18, 39, 42].

2. MATERIAL AND METHODS

Airports are often presented as an element influencing the functioning and investment attractiveness of particular regions, while issues concerning their impact on entities in their local environment are less exposed. Therefore, this research was undertaken to determine how the socio-economic situation in the communes: Goleniów, Ożarówice, Świdnik, Trzebownik, Zabierzów, are influenced by the airports: Solidarity Szczecin-Goleniów Airport, Katowice, Pyrzowice, Lublin, Rzeszów-Jasionka, and Kraków John Paul II International Airport. This was possible as a result of analyses of socio-economic indicators and information contained in

the development strategies of communes, reports on the state of the communes and local revitalization programmes. In February and March 2021, surveys were also conducted among representatives of local governments and the inhabitants of communes. Research tools (interview questionnaire, survey questionnaire) were prepared in the second half of 2020.

In each commune, a (structured, in-depth) interview with a representative of a local government was carried out following the sequence of questions included in the interview questionnaire. The interviewer asked detailed questions if needed. The survey was conducted using the Computer Assisted Telephone Interview (CATI) method. In each commune, an equal number of people were drawn, considering their gender and age. Subsequently, 600 people participated in the survey. The respondents were 52.2% female (43.5% aged 18-44, 23.8% aged 45-59, 32.7% over 59) and 47.8% male (32.6% aged 18-44, 47.9% aged 45-64, 19.4% over 64). The respondents had higher education 11.1%, secondary education 17.7%, vocational education 15.8% and primary education 55.4%. Of these, 8.6% worked at the airport, or someone in their family did. The respondents lived at varying distances from the airport. The largest group (37.0%) lived no further than 5 kilometres, the rest between 6 and 10 kilometres (26.0%), between 11 and 20 kilometres (25.9%), and between 21 and 30 kilometres (11.1%).

Data on airports were collected in 2020. Information necessary to characterize their functioning (number of flight operations, in 2013-2020⁴) was obtained from the Civil Aviation Authority of the Republic of Poland (CAV) and the official website of the Polish Air Navigation Services Agency (PANSa). Also, information about planned departures was obtained from the official airport websites⁵. The data provided by the Local Data Bank Statistics Poland (LDB SP) helped characterize the situation in communes where airports are located.

The computer program Statistica v.13.3 was used to analyse data from CAV, PANSa and LDB SP and statistical material obtained during the survey. The description of the statistical analyses, the results of which are included in this article, is presented in these works (Aczel, Sounderpandian, 2018; Weiss, 2012; Stanimir, 2005). Separate text files were created from the interviews that were recorded by transcription. Using the R v.4.0.0 program and the RStudio editor, these files were used while analysing the text contained within them (Figure 1).

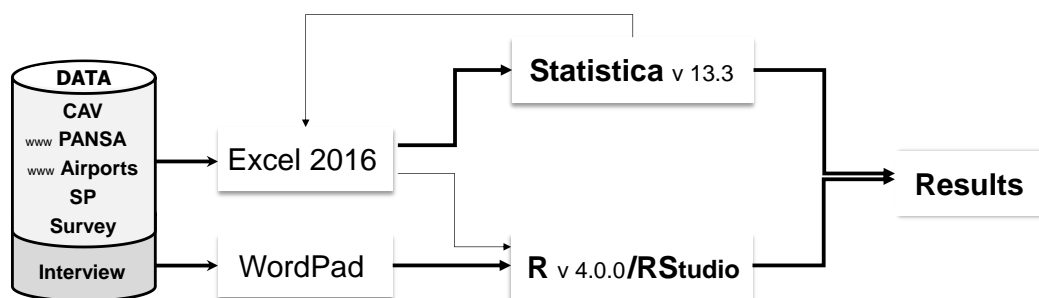


Fig. 1. Use of software during data preparation and analysis

Analyses of the text included: pre-processing the text, creating a word frequency matrix and then counting the frequency of words in each interview, counting correlations between words, analysing moods during the interviews, and determining similarity between interviews. These issues are discussed in these works (Ross, 2019; Wickham and Golemund, 2018; Silge and Robinson, 2017; Kwartler, 2017; Provost and Fawcett, 2015; Schutt and O'Neil, 2015). The text

⁴ Lublin Airport was opened in December 2012. The other ones were established earlier

⁵ <http://www.airport.com.pl>, <https://www.katowice-airport.com>, <https://www.airport.lublin.pl>, <https://www.rzeszowairport.pl>, <https://www.krakowairport.pl>

analyses were based on the solutions presented in the mentioned studies (Figures 5 and 6). The duration of the interviews and, subsequently, the number of words in the given files were not the same, so sometimes, for a better perception of the results (Figure 4), they were presented in a standardized dimension. The R program and RStudio editor were also used to analyze and illustrate the intensity of airport departures (Figure 2). In preparing Figures 2 and 4, the solutions presented on <http://www.hellomister.com.au/data-blog/2019/7/30/creating-an-arc-plot-part-1> (20.04.2021) and <https://quanteda.io/articles/pkgdown/examples/plotting.html> (18.03.2021) were used.

Analysing the number of flight operations that were carried out in successive time units, the method of indicators used for time series analysis with trend and seasonality was applied. Statistical hypotheses were verified using the test χ^2 . A standard level of significance of $\alpha = 0.05$ was adopted.

3. CHARACTERISTICS OF COMMUNES IN THE CONTEXT OF THE PRESENCE OF AIRPORTS

The population of the studied communes varies. The smallest, in terms of population, is the rural commune of Ożarówice (5795), and the largest one – the urban commune of Świdnik (39,136) (Table 1). Comparing the population potential of the individual communes and the voivodeships capitals, it was discovered that it ranges from 1% (Ożarówice) to 11% (Świdnik, Trzebowńsko) of the capital's potential. The analysis of the population potential in communes in the context of the different distances of communes from the provincial capitals determines the emergence of complex relationships and dependencies between these units and also affects their development potential.

Tab. 1

Selected statistical data (for 2019) for the studied communes

Socio-economic indicators	Communes				
	Goleniów	Ożarówice	Świdnik	Trzebowńsko	Zabierzów
Population	36,088	5795	39,136	22,296	26,708
Population per km ²	81	126	1923	247	269
Population in the capital city of the voivodeship where the commune is located	401,907	292,774	339,784	196,208	779,115
Population of non-working age per 100 people of working age	65.5	63.2	74.5	60.6	65.9
Population of post-working age per 100 people of pre-working age	108.7	122.7	155.6	110.7	106.7
Natural increase	-27	-23	-12	99	-17
Total migration balance	63	29	-202	305	280

Total revenue of the municipal budget per inhabitant in PLN	5869	6656	5298	4850	5921
Own income per inhabitant in PLN	3397	4101	2475	1157	3448
Total expenditures from the commune budget per inhabitant in PLN	5885	6520	5676	4862	6037
Employed persons* per 1,000 inhabitants	394	645	237	428	438
Share of registered unemployed in the population at working age (in %)	2.6	2.6	4.9	4.3	2.0
National economy entities in the REGON register per 10,000 population (at productive age)	1344 (2224)	1232 (2011)	931 (1625)	895 (1438)	1424 (2362)

*) Excluding business entities employing up to 9 persons and individual farms in agriculture.

Source: compiled based on data from the website of the Central Statistical Office

<http://swaid.stat.gov.pl/Dashboards/Statystyczne%20Vademecum%20Samorz%C4%85dowca.aspx>; <http://swaid.stat.gov.pl/Dashboards/Portret%20terytorium.aspx>.

Data on demographic dependency indicate that the studied communes experience the ageing population phenomenon, including a negative natural increase (except the commune of Trzebowńsko in 2019). In the ranking of communes in Poland, for the demographic dependency of the elderly, the commune of Świdnik took 86th place (out of 2,477 communes in Poland), the highest among the studied communes, which means that this group has the most unfavourable situation (<http://swaid.stat.gov.pl/Dashboards/Ranking%20JST.aspx>). In 2016-2019, the studied communes, except for Świdnik, registered a positive migration balance; more residents flowed into their territory (<http://swaid.stat.gov.pl/Dashboards/Portret%20terytorium.aspx>). In Świdnik, the outflow of the population outweighed the inflow; internal flows dominated here (one of the reasons for this could be the competitive and diverse labour market in Lublin). Considering the number of employees in entities of more than 9 people, the most favourable situation in 2019 was in the commune of Ożarówice - 645 people; in the communes of Goleniów, Trzebowńsko and Zabierzów, it was similar, as the number of employees ranged from 394 to 438, while the lowest was in the commune of Świdnik - 237. The share of the registered unemployed in the working-age population indicates a relatively favourable situation in the following communes: Zabierzów, Goleniów, Ożarówice, and more difficult in the communes of Trzebowńsko and Świdnik (Świdnik ranked 96th in Poland in 2019 for registered unemployed, <http://swaid.stat.gov.pl/Dashboards/Ranking%20JST.aspx>). The communes of Zabierzów, Goleniów and Ożarówice stand out for their level of entrepreneurship, with the number of business entities per 10,000 population of working age being 2362; 2224; 2011, respectively. For the number of businesses per 1000 residents, in comparison with all 2477 communes in Poland in 2019, the Zabierzów commune ranks highest (78th).

Analysis of the per capita income data shows that the highest income was recorded in the commune of Ożarówce, while the lowest was in the commune of Trzebownisko. The amount of income determines the ability to implement statutory tasks to meet social needs. An important indicator of the financial potential of a commune is the percentage of its own revenue in the total revenue per capita; in individual units, it ranged from 23.86% in Trzebownisko commune to 61.66% in Ożarówce commune (Zabierzów, Goleniów were close to 58%). Per capita spending increased in all communes from 2016 to 2019. The average share of investment expenditures in total expenditures varied, and in 2016-2019, they amounted to: in Trzebownisko - 13.98%, in Ożarówce - 17.25%, in Zabierzów - 18.11%, Świdnik - 19.03%, and Goleniów - 21.16% (calculated based on data from <http://swaid.stat.gov.pl/Dashboards/Portret%20terytorium.aspx>), conditioning the future development of these communes.

The communes in which the survey was conducted were located within several kilometres to several dozen kilometres from the largest urban centres in the region (the capital cities of the regions) (Goleniów commune-city of Szczecin - 40 km, Ożarówce commune-city of Katowice - 26 km, Świdnik-city of Lublin - 10 km, Trzebownisko commune-city of Rzeszów - 6 km, Zabierzów commune-city of Kraków - 13 km). In the development strategies of the individual communes, their location to large cities was considered a strength, as was the airport located in their territory. The close proximity of an airport to a large city/town in the region, with good access to road and rail communications, means it is a favourable location. This is the case for the airports presented in this paper. In turn, the attractiveness of an airport is determined by the places to which planes depart, how often they do and which airlines serve particular routes. From Szczecin-Goleniów, Katowice, Lublin, Rzeszów-Jasionka and Kraków-Balice airports, aeroplanes depart to other airports, which are generally located in Europe. In Figure 2, the weekly intensity of flights to each destination is shown. Some can only be reached from Katowice or Kraków. Additionally, considering the weekly flight intensity and the number of carriers, there is a clear advantage of Kraków-Balice airport over the other airports.

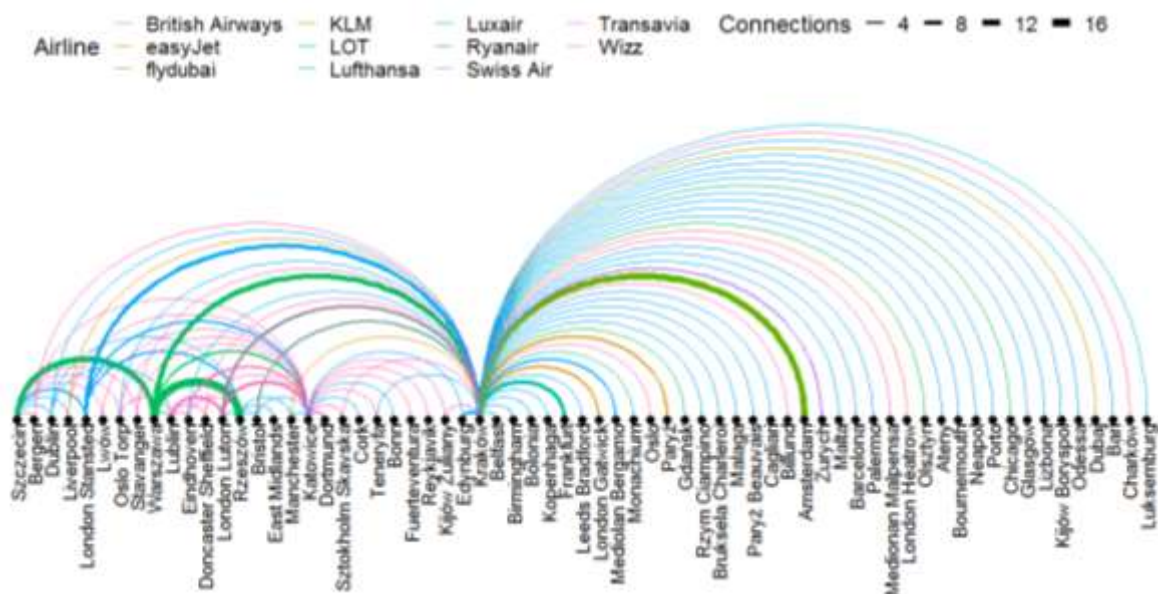


Fig. 2. Weekly density of departures from Szczecin-Goleniów, Lublin, Rzeszów-Jasionka, Katowice, and Kraków-Balice

Source: Own elaboration based on data from airports

In the analysed documents of the communes, the projected development of air transport was accepted as a development opportunity, but the SARS-COV-2 pandemic significantly limits this development (ACI, 2020; Airport in Jasionka, <https://trzebownisko.pl/?c=mdAktualnosci-cmPokazTresc-415-3151>). In the presented airports, the impact of both SARS-COV-2 (Figure 3 - yellow background), as well as the phenomenon of seasonality were visible (Sobczyk, 2021; Aczel and Sounderpandian, 2018; Warząła, 2016). The decrease in the number of flight operations was due to the introduced restrictions on the movement of people; it also resulted in the closure of resorts, hotels, restaurants, and companies providing other services around the airport⁶. Variable demand for services, characteristic of air transport, resulting both from the occurrence of seasons, weather conditions, and social habits, leads to incomplete, sometimes excessive use of airport capacity. In each airport, in the first and second quarters, the number of flight operations was lower, and in the third and fourth quarters - higher than the quarterly average. While in earlier years, the first quarter marked the beginning of an increase in the number of flight operations performed, and in the fourth quarter, a decrease. In 2020, disregarding the significant decrease in the number of operations, an increase was recorded from the second quarter and a decrease in the third quarter. This phenomenon occurred at all airports presented.

The presence of an airport in communes is crucial in the context of communication accessibility of particular regions and their capitals, affecting the investment attractiveness of these locations and subsequently attracting other economic entities to the territory of the communes. The analysis of the documents shows that the authorities of the communes in which the research was conducted were striving, within their capabilities, to provide an integrated communication infrastructure of high quality, enabling the efficient movement of people and goods. Road and railroad infrastructure were built or modernized in the communes, connecting the region's capitals with airports located in their area.

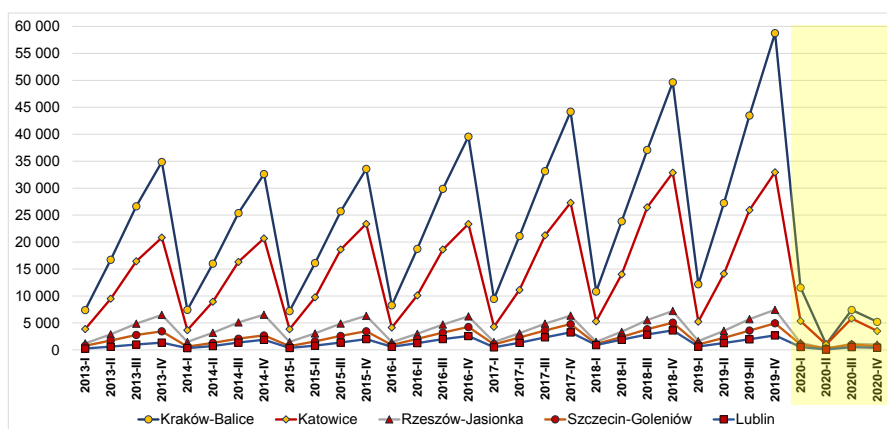


Fig. 3. Number of performed air operations at airports, in individual quarters, from 2013-2020
Source: own elaboration based on data from CAV and PANSA

⁶According to data presented by PANSA and the International Air Transport Association (IATA), other airports in Europe have also seen a decline in flight operations and connections. According to IATA data, European carriers saw a 73.7% decline in passenger traffic in 2020 compared to 2019. Cf. *Air Passenger Market Analysis* <https://www.iata.org/en/iata-repository/publications/economic-reports/air-passenger-monthly-analysis---december-2020/> 20.02.2021; *2020 Worst Year in History for Air Travel Demand* <https://www.iata.org/en/pressroom/pr/2021-02-03-02/> 24.02.2021. The negative impact of the SARS-COV-2 pandemic on operations is also confirmed by statistics presented by the Air Transport Action Group - *Aviation benefits beyond borders*, 2020.

The Goleniów commune is well connected. Through its area runs Express Road S3, located at a distance of 24 km from the junction with motorway A6 and National Road No 10. Railroad and air connections complement the road connections (*Report on the state of Goleniów commune...*, 2020). Through the area of the commune runs the Szczecin Metropolitan Railway (118 km), which is to be fully opened in 2022⁷. Railroad stops serving the Goleniów Industrial Park (GIP) is to be established in the commune, which will improve commuting for people from outside the commune (*Development Strategy of Goleniów Commune...*, 2014). Companies located in the GIP create about 5000 jobs in the commune and provide revenue to the budget. These are companies representing various industries: agricultural processing, food production, leather processing, packaging and processing of decorative stones, production of trailers and semi-trailers, yacht hulls, blades for wind power plants, e-commerce and others (*Report on the state of the commune...*, 2020). The presence of the airport is essential from the perspective of increasing the investment attractiveness of the region and the commune, providing companies with shorter delivery times, among other things.

The commune of Ożarówice has a well-developed road network and is well connected with the National Road 78, Provincial Road 913, Express Road S1 and the A1 motorway. The International Airport located in the commune is conducive for investments (for example, reconstruction of the Tarnowskie Góry-Siewierz railroad line supplementing transport connections between urban centres in the voivodeship (*Report on the condition of the Ożarówice commune...*, 2020). In the area of the commune, there is an economic activity zone, the activities of which, according to the intentions of the authorities, are aimed at counteracting unemployment, striving to tidy up and develop the area after the military unit, as well as supporting entrepreneurs through temporary property tax exemption. The existence of the zone, in combination with the presence of the airport, is a factor conducive to the development of entrepreneurship (*Strategy for solving social problems of Ożarówice commune ...*, 2016). Consequently, trade and services develop, especially parking, transport, hotel and catering, providing a source of economic development and an incentive for new residents to settle.

The Świdnik commune is an industrial centre located about 10 km east of Lublin. The proximity to the regional capital creates opportunities for the commune's residents to benefit from higher-end services and a diverse labour market (*Development strategy of the Świdnik commune...*, 2015). Świdnik lies on a route marked by National Road – No. 12 and 17. It has access to a railroad line connecting, among others, Lublin and Świdnik with Warsaw, as well as in the eastern direction with Kyiv and Lviv. Port Lotniczy Lublin S.A., located within the commune, operates air transport on domestic and international lines (*Development Strategy of the Świdnik commune...*, 2015). Regionalny Park Przemysłowy sp. z o.o. has been operating in the territory of Świdnik since 2005 (<http://www.park.swidnik.pl/>), aimed at supporting restructuring and regional development, in particular, labour market activation. The Local Revitalization Programme of Świdnik identifies areas with negative social phenomena that require actions supporting the development. One such area is the Economic Activity Zone (*Local Revitalization Programme...*, 2017), located close to the airport and connected to the road and rail network. Business surveys indicate that the zone is attractive for entities in the following industries: aviation, logistics and business services ([---

⁷ The investment encompasses 40 hub stops, including 31 existing ones that will be modernised and expanded, and 9 new stations, all adapted to the needs of the disabled and elderly. Nearly 2580 new parking spaces will be created, and 37 facilities will be modernised or built, including bridges, railroad overpasses and footbridges, as well as 12 crossings under the railroad tracks. The value of the undertaking - PLN 741.2 million, including PLN 512.2 million from the EU funds; \[Zachodniopomorskie.pl\]\(http://zachodniopomorskie.pl\), \[PRK24.pl\]\(http://prk24.pl\), <https://portalkomunalny.pl/szczecin-bedziemial-swoja-kolej-metropolitalna-za-740-mln-zl-377924/>.](https://www.swidnik.pl/strefa-</p></div><div data-bbox=)

coraz-bardziej-aktywna/. The economic structure of the city is dominated by the industrial plant WSK PZL Świdnik S.A., whose economic condition influences the functioning of the city. It plays the role of the largest employer and a large payer of property tax to the commune's budget (*Development Strategy of the Świdnik commune...*, 2015). The presence of WSK PZL Świdnik S.A. and the airport (*Local revitalization programme of the city of Świdnik...*, 2017), developed technical infrastructure, high qualifications of the local community, level of entrepreneurship and high quality of education are considered as strengths of the Świdnik commune.

The Podkarpackie Science and Technology Park Aeropolis, which is part of the Special Economic Euro Zone-Park Mielec, is adjacent to the Rzeszów-Jasionka airport, located in the Trzebownisko commune. The presence of the special economic zone and the airport, in the opinion of local authorities, is a fundamental factor for its socio-economic development (*Development strategy of Trzebownisko commune...*, 2016). The above-mentioned factors determine the changes in the profile of the commune's economy from agricultural-industrial to industrial. The aerospace, electro-mechanical, electronic and IT industries are developing in the commune (*Strategy...*, 2017). Its development determines new jobs and increases the local government's income. In the commune of Trzebownisko, due to the well-developed transportation network and proximity to the regional capital, residents have wider access to secondary and higher education services, as well as cultural and other services offered in the regional capital - Rzeszów.

Due to its location and natural assets, the Zabierzów community is perceived as an attractive place to live, with direct access to a large labour market and specialized services. The airport is located in Zabierzów, which is one of the factors contributing to the growth of economic activity in the area and is conducive to the growth of tax revenue for the local government. For potential investors, the attractiveness of the Commune (*Development strategy for the Zabierzów commune...*, 2014) is influenced by the proximity of a large retail market, transport accessibility which determines the development of trade, a diversified and highly specialized labour market, and access to high-quality services. Thus, the commune's favourable location, convenient communications and up-to-date local zoning plans create advantageous conditions for investors to operate.

4. OPINIONS OF LOCAL GOVERNMENT REPRESENTATIVES ON THE ROLE OF THE AIRPORTS IN THEIR COMMUNE

When referring to the influence of the airport on the socio-economic situation in their commune, representatives of local authorities said that they perceive its role as a factor enhancing the attractiveness of the commune and attracting investors from various sectors, a taxpayer, an employer, and a provider of transport services. This is indicated by the interviewees' frequent use of the following words: *companies, taxes, money, work, parking, and service*. In their sentences, the word *commune* often appeared together with such words as *impact, built, taxes, service, and economic*.

On the one hand, the interviewees perceived the role of the airport as a factor that contributes to positive changes in the commune. However, on the other hand, they pointed to the negative impact of aeroplanes on the natural environment and living conditions of the inhabitants (the effect of sound intensity) and the occurrence of restrictions on the development of areas around the airport⁸. This is evidenced by the following words: *noise, area, build, and road*. The word

⁸ The President of the Civil Aviation Authority, in accordance with Article 87(2) of the Act of 3 July 2002 Aviation Law (Journal of Laws of 2018, item 1183, as amended), May Issue, at the request of the applicant, an opinion on

noise occurred together with such words as *compensation*, *birds*, *planes*, *companies*, *traffic*, and *roads*. Analysing the statements of the representatives of the communes, it was also found that, with varying intensity, they used particular words that referred to the presence of an airport in their commune (for example, Figure 4).

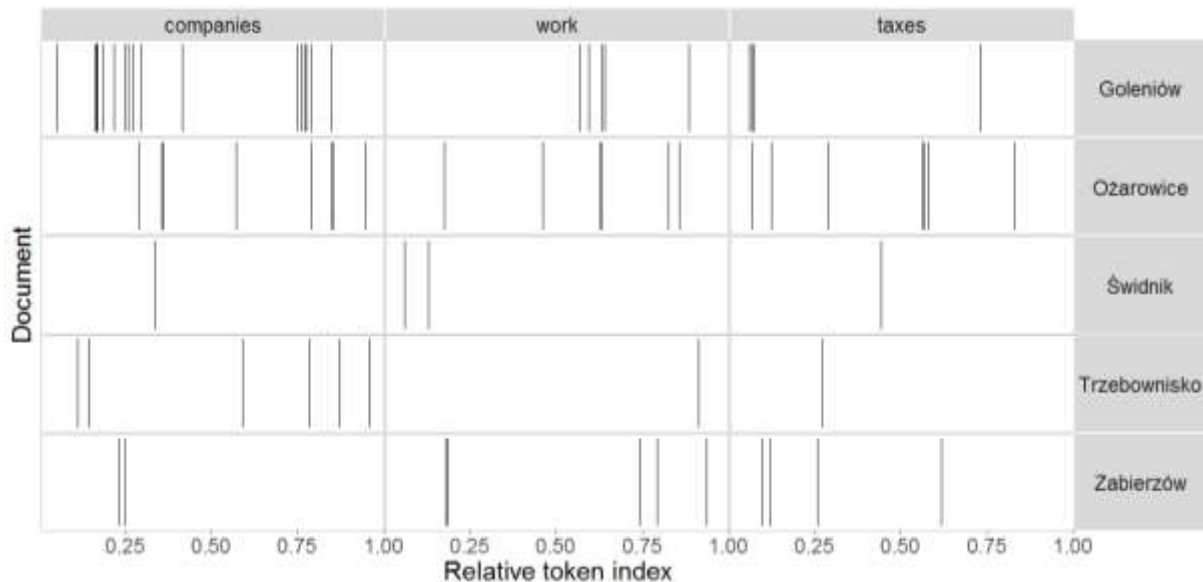


Fig. 4. Frequency of selected words in commune representatives' statements

During the interviews in Goleniów, Ożarówice, and Świdnik, a good mood prevailed (Chart 5). This is because of the occurrence in the statements of the municipal representatives, among others, such words as *work*, *good*, *great*, *happy*, and *attractive*.

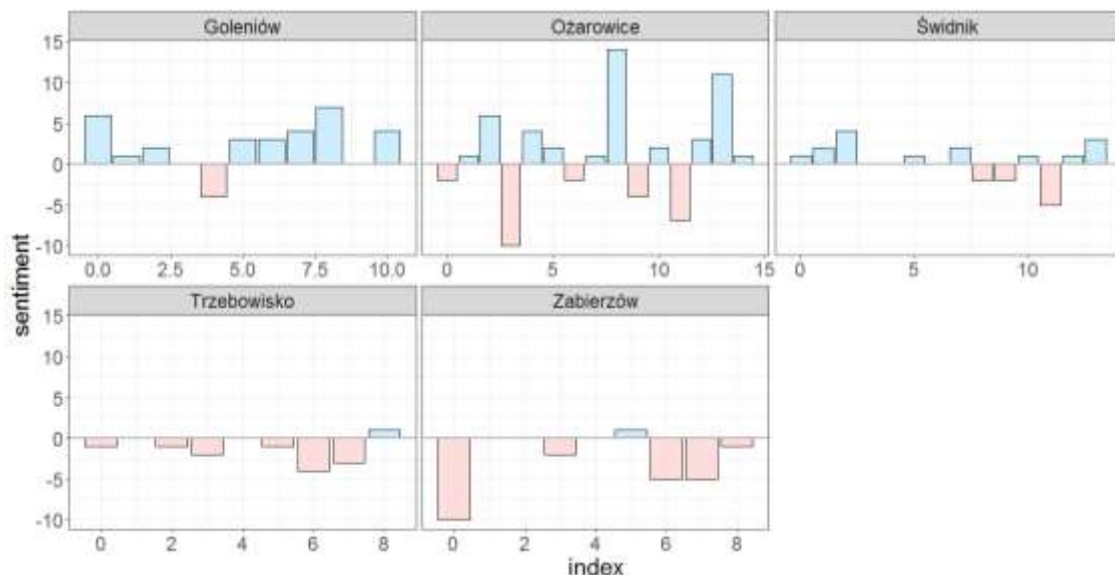


Fig. 5. Change of mood during the interview in individual communes

the possibility of locating the investment according to the level of the development, <https://www.ulc.gov.pl/pl/lotniska/uzgadnianie-lokalizacji>. Some airports, for example, Chopin Airport in Warsaw, due to its proximity to residential zones, have a ban on night flights. Chopin Airport has had a "curfew" from 11:30 p.m.-5:30 a.m. since March 25, 2018, and is generally in effect on all days of the week. <https://www.lotnisko-chopina.pl/en/news/0/771/szczegoly.html>.

In the commune of Goleniów, the good mood was a result of the impact of the port on improving transport accessibility of the commune, including for investors operating in the Goleniów Industrial Park, and on increasing opportunities for the development of new directions in economic activities, such as logistics, e-commerce, airline services. In addition, as emphasized by the interviewees, the presence of the port contributed to the development of infrastructure, including rail, and also had a positive impact on the image of the commune.

In the commune of Ożarówice, the airport is seen as a source of economic activity. Its existence is a developmental impulse for companies in the vicinity which provide services around the airport or work for the airport. Moreover, the presence of the airport is seen as an asset in pulling new businesses to the commune. The commune of Świdnik also emphasized the role of the airport in attracting investors to the economic activity zone and the implementation of investments in technical infrastructure, which improved driving comfort and accessibility to the commune. In the opinions of representatives of the Trzebowniko and Zabierzów communes, words expressing emotions were more often connected with negative associations than words used in other communes: *problem, noise, hard, and difficult*. In Trzebowniko commune, despite the use of negative words, the airport is perceived as a large employer in the local labour market. Its importance has been growing in recent years due to the development of road infrastructure, which improves access to the airport. Currently, the airport's traffic is not large enough to be a source of noise nuisance to residents of the community (and before the SARS-COV-2 pandemic, an airport of such size was not perceived to cause noise nuisance either). In the Zabierzów commune, attention was drawn to the transport difficulties associated with the increase in traffic due to the location of the airport and the noise nuisance (the approach path to the runway is partially located over urban areas). At the same time, the indirect impact of the port on the emergence of new businesses in the commune was highlighted, which benefits from the investment attractiveness of the commune (developed infrastructure, proximity to a large sales market) and contributes to the local government budget through tax revenues.

Words expressing emotions accounted for 20-25% of all words used by persons responding to questions asked by the researcher. They were associated with all types of emotions (anticipation 38.8%, trust 19.4%, fear 10.2%, sadness 9.4%, joy 8.8%, anger 5.2%, disgust 4.2%, surprise 4.2% - Figure 6).

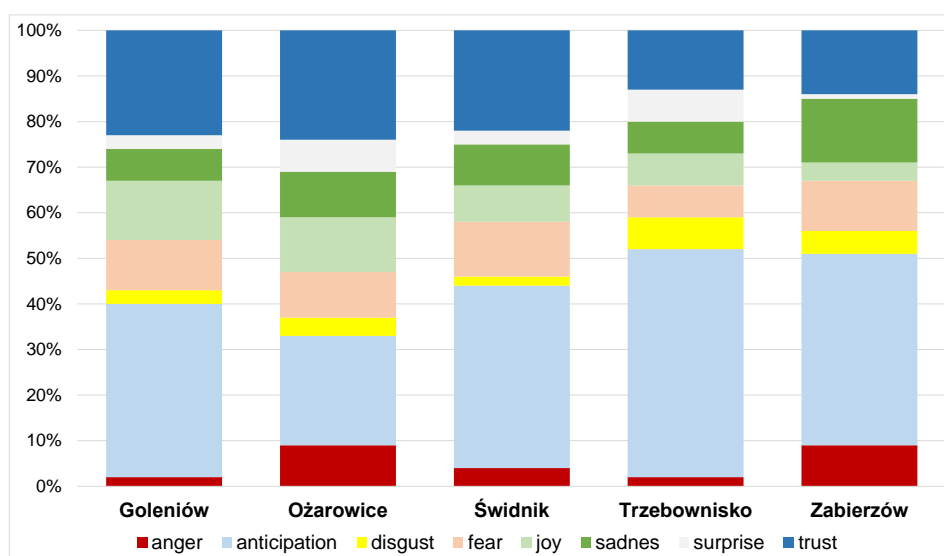


Fig. 6. Emotions as expressed by representatives of particular communes

Emotions connected with expectation, trust, and joy in the context of new opportunities and development plans based on the current strengths of the commune (high-quality technical infrastructure, developing new economic zone, the activity of companies in the Goleniów Industrial Park, good situation on the labour market) dominated in the opinions of representatives of the Goleniów authorities. The commune started to create a new zone – around the airport, which is supposed to attract investments in e-commerce (warehousing and forwarding) and companies serving the aviation industry, making various types of repairs and providing aircraft service. It was emphasized that the development of companies servicing the aviation industry is also vital in the context of the proximity of Berlin airport. Moreover, in case of difficult weather conditions, aeroplanes from Berlin can be redirected to Goleniów to organize an alternative bus transport. Concerns (sadness, fear), in turn, were expressed in the background of the outflow of young people from the commune and the phenomenon of demographic decline. The commune of Ożarówice was also dominated by expectation, trust, and joy resulting from the increase in activity in the commune since the arrival of the airport, having the ability to overcome difficulties in the development process by residents and local authorities. Emotions expressing anger, on the other hand, were to some extent related to insufficient coordination at the regional level in connection with the use of opportunities created by the airport for the surrounding area and the restrictions imposed by the Civil Aviation Authority on the scope and use of the land in the area around the airport. Similar emotions accompanied the interview conducted in the commune of Świdnik, where expectations and trust were dominant, resulting from the benefits brought by the location of the port in the commune, the investments that have been made, which have contributed to improving the quality of life in the commune, while concerns related to the potential closure of the port and the consequences of this for the labour market. In the Zabierzów commune, the emotions expressed - expectations and confidence - were related to the businesses being established within the commune because of transport accessibility and the proximity to a large market, having a prominent employer and the planned investments. Disappointment and sadness were associated with the reduced importance of the commune in the name of the port, which caused a negative response among residents, as well as the possible outflow of residents after the rebuilding of the airport runway due to increased noise. In the commune of Trzebowniko, in turn, positive emotions resulted from the role of the port concerning the labour market and economic recovery, as well as the quality of transportation infrastructure. Concerns were dictated by the future of the airport, which requires support from the owner, as the number of operations makes it impossible to maintain its profitability and leads to reduced working hours for its employees.

5. IMPACT OF THE AIRPORT ON THE COMMUNITY – RESIDENTS’ ASSESSMENT

Of those who took part in the survey, most respondents (44.8%) were satisfied with living in an area with an airport (37.5% from Goleniów commune, 48.3% from Ożarówice commune, 48.7% from Świdnik commune, 47.5% from Trzebowniko commune, 41.8% from Zabierzów commune). Others (26.2%) were not satisfied with this (31.7% of respondents from the Goleniów commune, 26.7% from the Ożarówice commune, 24.0% from the Świdnik commune, 22.5% from the Trzebowniko commune and 26.2% from the Zabierzów commune) or were indecisive (29.0%). The distribution of responses by men and women was similar. Responses to this question were differentiated by the respondents' distance from the airport (statistically significant relationship, $p=0.00025$). It was assumed that the distance of residence may be related to respondents' perception of the sound generated by the landing and taking off

aeroplanes as transportation noise (for example, the location of the residence to the runway is relevant here). It was found that the highest percentage of satisfied respondents (55.2%), and the lowest percentage of dissatisfied respondents (13.4%), was in the group of those who lived farthest from the airport. Further analysis revealed that every fourth respondent among those living closest to the airport and every third respondent among those living between 6 and 10 kilometres away from the airport expressed dissatisfaction. Lack of information about the location of the respondents' homes, for example, regarding the runway from which planes take off and land, does not allow for a clear interpretation of the responses obtained.

In the opinion of most respondents (55.9%), the presence of an airport improves the quality of life for residents in their location (50.0% in Goleniów commune, 57.5% in Ożarowice commune, 57.0% in Świdnik commune, 55.8% in Trzebowniko commune and 59.0% in Zabierzów commune). The opposite opinion, indicating that the port lowers the quality of life, was expressed by 18.7% of the respondents (21.7% in the commune of Goleniów, 19.2% in the commune of Ożarowice, 16.5% in the commune of Świdnik, 16.7% in the commune of Trzebowniko, and 19.7% in the commune of Zabierzów). The remaining respondents did not take a definite stand. The distribution of responses by men and women on this issue was similar. Differences were evident when analysing respondents' answers considering their distance from the airport (a statistically significant relationship, $p=0.00601$) – Figure 7 – and their education (a statistically significant relationship, $p=0.00239$).

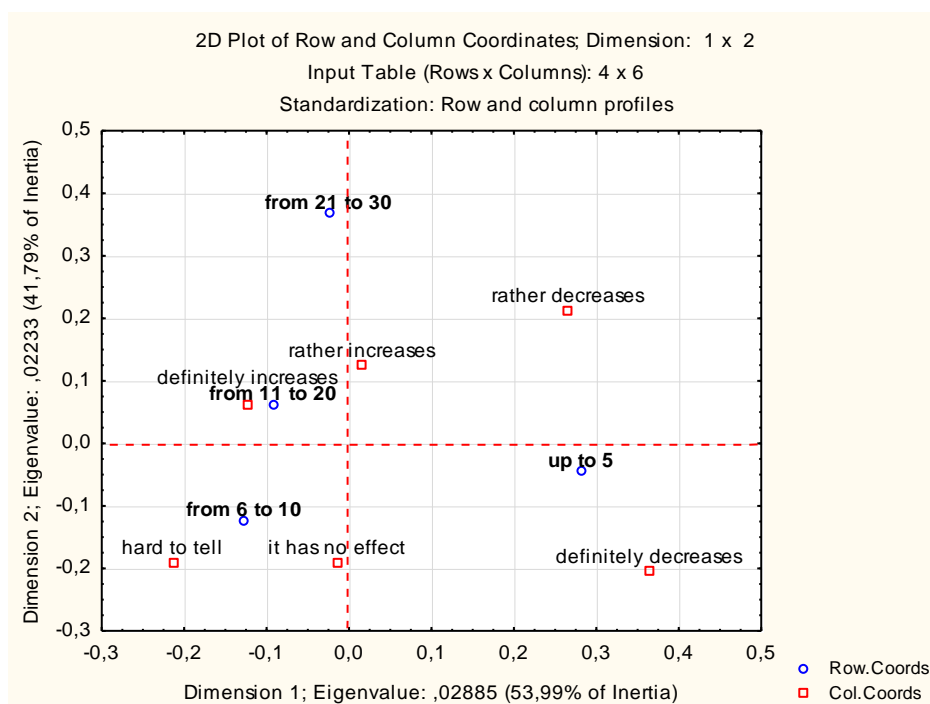


Fig. 7. Assessment of airport impact on the quality of life and distance of residence from the airport

It was found (omitting those living within 6-10 kilometres of the airport) that as the distance of residence increased, the percentage of those who believed the airport increased the quality of life of the residents increased, and at the same time, the percentage of those who thought it had a negative impact on their quality of life decreased. Except for those with high school education, in the remaining groups, it was noted that as education increased, the percentage of those perceiving a positive impact of the airport on the quality of life of residents in their locality

increased. In the group of people with primary education, there were 55.9% of such people, with vocational education 56.8%, with secondary education 44.9%, and with higher education 71.6%. At the same time, in the aforementioned groups, with the increase in education, the percentage of those who assessed that the presence of the port lowers the quality of life of residents decreased (primary 18.7%, vocational 11.6%, secondary 30.8%, and higher 10.4%). Further analysis found that people with high school education living within 6-10 kilometres of the airport were most likely to speak critically about the airport's impact on their quality of life. No statistically significant relationship was found between respondents' opinions on the impact of the airport on their quality of life and their place of employment (working at the airport or not).

In each of the communes surveyed, opinions that the airport is conducive for job creation for the local population were prevalent among respondents (Goleniów 53.3%, Ożarówice 56.7%, Świdnik 58.7%, Trzebowńsko 60.8%, Zabierzów 65.6%). These opinions, regardless of age, education and place of residence, were expressed equally by women (58.4%) and men (59.7%). Also, except for the Goleniów commune (40.8%), most respondents felt that the airport offered well-paid jobs (Ożarówice 56.7%, Świdnik 52.1%, Trzebowńsko 54.2%, Zabierzów 54.9%). These responses were given by both men and women from each age group, irrespective of their education and place of residence.

The presence of an airport, in the opinion of most of the surveyed, is a magnet for investors who open businesses in its vicinity, seeking to strengthen their competitive advantage based on the transport accessibility of the particular location (Goleniów 53.3%, Ożarówice 55.0%, Świdnik 57.0%, Trzebowńsko 56.7%, Zabierzów 60.7%). According to most respondents (Goleniów 55.0%, Ożarówice 55.0%, Świdnik 56.2%, Trzebowńsko 58.3%, Zabierzów 65.6%), women and men alike, regardless of their age, posited that the airport also contributes to the development of local businesses (such as hotels, motels, parking facilities, bars, car rental companies, cleaning companies) that provide airport-related services.

Respondents reported varying degrees of perceived importance of the airport as a taxpayer contributing to the municipal budget (35.8% from Goleniów commune, 24.2% from Ożarówice commune, 32.2% from Świdnik commune, 22.5% from Trzebowńsko commune, 21.3% from Zabierzów commune). These benefits were usually perceived by those who declared a connection with the airport. At the same time, it should be noted that according to the Act on Local Taxes and Fees⁹, buildings, structures and land occupied by them within the area of parts of public-use airports are exempt from property tax. Furthermore, revenues from this tax come from companies that have been established as a result of the revival of economic activity in the commune due to the presence of the airport or are engaged in cooperation with the airport. The local government budget receives income tax from individuals and legal entities according to the rules outlined in the Act on Income of Local Government Units¹⁰.

The presence of an airport is, on the one hand, a favourable factor, but on the other hand, it is a place associated with noise generated by aircraft engines. This problem is not present to the same degree in every commune. Noise nuisance was reported by 42.5% of respondents in the Goleniów commune, 58.3% in the Ożarówice commune, 38.0% in the Świdnik commune, 35.0% in the Trzebowńsko commune and 48.4% in the Zabierzów commune. They were indicated by respondents of all ages, irrespective of their education. The survey confirmed that noise is more disruptive to people living closer to airports: 79.6% of respondents living within 5 km of the airport, 46.2% within 6-10 km, 21.2% within 11-20 km, and 10.6% within 21-

⁹Journal of Laws of 1991, No. 9, item 31, as amended, art. 7.1

¹⁰Journal of Laws of 2003 No. 203, item 1966, as amended, art. 3.2., 4.2., 4.3

30 km (a statistically significant relationship, $p=0.0000$) indicated noise-related problems (Figure 8).

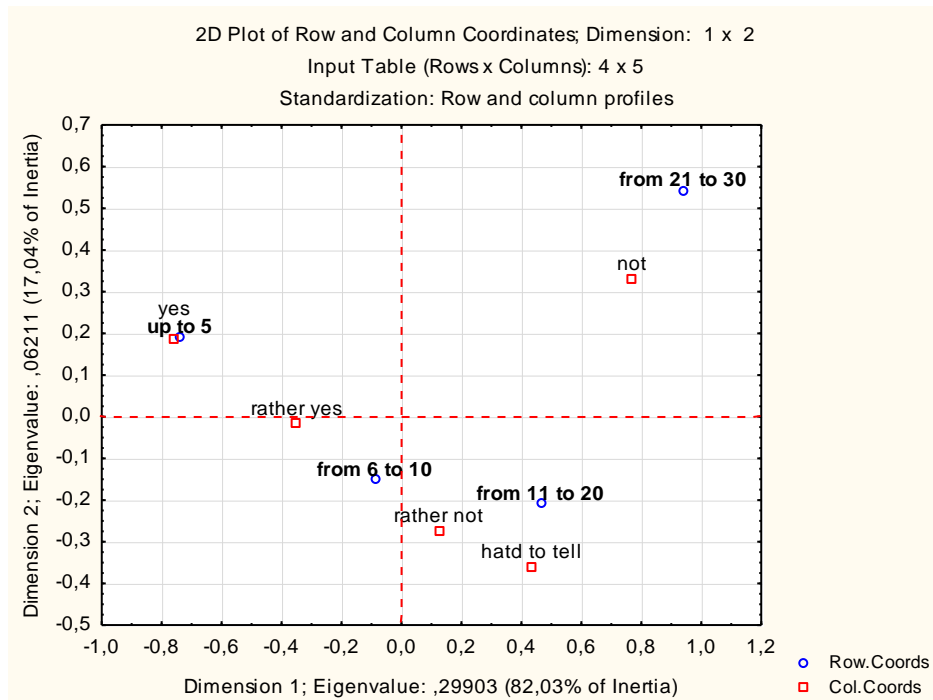


Fig. 8. Assessment of noise impact on quality of life and distance from airport

Survey participants also perceived a negative impact of the airport on the environment. In each of the communes, respondents (33.3% Goleniów, 34.2% Ożarówice, 21.5% Świdnik, 31.7% Trzebowniko, 30.3% Zabierzów) perceived some deterioration in air quality, both men and women, regardless of age, education and distance of their residence from the airport (it can be assumed that they do not experience this relationship and this is a general perception). In the opinion of some respondents (Goleniów 22.5%, Ożarówice 22.5%, Świdnik 8.3%, Trzebowniko 14.2%, Zabierzów 26.2%), the airport contributes to increased car traffic. In this group of people, there were women and men, representatives of all groups considering their age and education. As the distance between their residence and the airport increased, the percentage decreased (up to 5 km 21.7%, 6-10 km 19.7%, 11-20 km 17.9%, 21-30 km 10.5%).

6. CONCLUSIONS

Airports, playing a pivotal role in the transport system as a link between air transport and land transport, to a greater or lesser extent, influence the socio-economic situation in their surroundings. The presence of an airport significantly broadens communication opportunities for residents of particular communes and has a positive influence on the investment attractiveness of the commune and the region. Industrial parks/business activity zones are developed in the vicinity of airports, allowing the potential of an attractive location to be capitalized in space. More important is the location of the airport to large cities and access to road and rail transportation. All the airports presented in this article are located within a few to several dozen kilometres from the capitals of their particular regions, with good access to expressways and railroad connections. The analysis of the documents of individual communes

shows that their authorities recognize these opportunities. They perceive the presence of the airport as an asset and the forecasted development of air traffic as a chance for growth. This approach was also evident in the statements of communes' representatives, who saw the positive impact of the airport on the socio-economic situation in their communes. Benefits associated with the presence of the airport in their commune were also noted by most of the communal residents who participated in the study, judging that it improves the quality of life in the commune by contributing to the creation of jobs, attracting investors, generating income to the municipal budget through taxes paid. The analysis shows that the benefits were usually perceived by respondents from those communes where airports carry out more air operations and offer better opportunities for passenger movement.

Moreover, airports also impact the environment because of the number of flight operations performed and the number of passengers served. Publications often draw attention to the noise generated by aircraft engines and increased car traffic around airports. These disruptions are intensified at certain times due to the seasonality characteristic of air transport. This adverse effect was evident in the responses of residents of communes, where the distance of residence from the airport differentiated their opinions on the impact of the airport on the situation in their commune. The problem of noise was also highlighted in the statements of the communes' representatives.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The authors alone are responsible for the views expressed in this article, and they do not necessarily represent the views, decisions or policies of the institutions they are affiliated to.

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Received 22.07.2022; accepted in revised form 19.10.2022



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